



Original Contribution

LONG TERM EXPOSURE OF LIVE POULTRY TO ALPHA-CYPERMETHRIN AND ITS RESIDUE LEVELS IN POULTRY MEAT

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ABSTRACT

A study on alpha-cypermethrin residues in liver, breast muscles (white meat) and leg muscles was performed in fowl, following long-term exposure to three different doses of alpha-cypermethrin (12 mg/kg, 30 mg/kg and 60 mg/kg). Liver alpha-cypermethrin residues were detected up to 48 h after the last treatment. Alpha-cypermethrin residues were not found in meat (white and red) in any of samples obtained at post treatment hours 24, 48 and 72. It was concluded that: (1) the observed liver alpha-cypermethrin residues in fowl were lower than the maximum allowed residue limits in animal foodstuffs and (2) alpha-cypermethrin residues were not found in both white and red meat from birds subjected to this treatment.

Key words: alpha-cypermethrin, residues, fowl

INTRODUCTION

The extensive use of synthetic pyrethroids in agriculture where both plants and domestic animals are affected necessitates the detailed study on the concentrations of their residues in foodstuffs

Foodstuffs of vegetable origin are comprehensively studied with regard to alpha-cypermethrin residues and the time of their elimination. Many publications (1, 2, 3, 4) report the amounts of intact alpha-cypermethrin or its metabolites in vegetables, fruits, cereal crops etc, after application of alpha cypermethrin-containing preparations for control of insects or after experimental treatments.

On the basis of this information, the maximum residue limits (MRL) of alpha-cypermethrin in foodstuffs of vegetable origin have been determined.

The residue concentrations are clearly stated in Codex Alimentarius Commission (1986), varying from 0.05 to 2 mg/kg for the various vegetable products.

Alpha-cypermethrin residues could also be detected in animal foodstuffs as meat and meat products, milk, eggs etc. (5, 6, 7, 8, 9,

10). The increase in these residues could mainly occur via two routes: after treatment of animals and premises with alpha-cypermethrin preparations against ectoparasites and when animal rations contain alpha-cypermethrin residues.

The maximum residue limits (MRL) for animal foodstuffs are given in Codex Alimentarius Commission (1996).

Some of maximum residue limits for alpha-cypermethrin are as follows:

Product	MRL(mg/kg)
Carcass meat and fat	0,2
Meat products	0,2
Eggs	0,05
Milk	0,01

Having studied the kinetics of alpha-cypermethrin in rats, Sampaio et al. (11), have established the concentrations of residues that were 2.5 mkg/g in the first 24 hours and after one week, decreased to 0.96 mkg/g.

Data for pyrethroid residues in fowl are available in the publications of Saleh et al. (12), Hutson & Stoydin (13), Blab and Weiler (14) Sogeval et al. (15). These authors have found that the highest level of residues was that in liver up to the 2nd post treatment day and thereafter it rapidly decreased by the post treatment 4th-5th day.

Hutson & Stoydin (13) demonstrated that the

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highest post treatment residues were determined in avian liver (0.97 mg/kg). Four hours after the last alpha-cypermethrin treatment that lasted for 14 days, the authors observed that breast muscles contained 0,012 mg/g, leg muscles – 0,022 mg/g and peritoneal and subcutaneous fat – 0.08 mg/g. The investigators have also studied the content of alpha-cypermethrin in eggs and established 0.1 mg/g in egg white and 0.15 mg/g in egg yolk.

MATERIAL AND METHODS

Seventy-two birds (54 experimental and 18 control) from the White Cornish breed were studied. The experiments were performed in the Experimental Base of the Department of

Animal Genetics and Breeding. The alpha-cypermethrin residues were assayed in samples from the liver, breast muscles (white meat), and leg muscle (red meat). Sampled birds had been treated for 13 weeks at doses of 12 mg/kg, 30 mg/kg and 60 mg/kg. Alpha-cypermethrin concentrations were determined 24, 48 and 72 hours after the end of treatments. The quantitation of residues was done by gas chromatography as described by Braun and Stanek (16) in the chemical laboratory of the Hygiene Centre, Sofia. The data were statistically processed.

RESULTS AND DISCUSSION

The data on alpha-cypermethrin residues in the liver of birds, treated with Fastac EK10.

Table 1: The data on alpha-cypermethrin residues in the liver of birds, treated with Fastac EK10

Dose	Alpha-cypermethrin residues (mg/kg)					
	Hours after the last treatment					
	24 h	n	48 h	n	72 h	n
12 mg/kg	0,032	6	0,015	6	0,00	6
30 mg/kg	0,035	6	0,02	6	0,00	6
60 mg/kg	0,039	6	0,024	6	0,00	6
Control	0,00	6	0,00	6	0,00	6

Insecticide residues in liver were detected up to the 48th hour after the last treatment. Following the first 24 hours, residue concentrations ranged between 0.32 mg/kg in the groups treated at 12 mg/kg to 0.32mg/kg in birds exposed at 60 mg/kg. The presence of alpha-cypermethrin residues in the liver 24 and 48 hours after end of treatment was proportional to applied dose, although the variation was within a narrow range. No alpha-cypermethrin residues were detected in the liver of treated birds 72 hours after the last treatment.

Alpha-cypermethrin residues were neither present in meat (white and red) sampled 24, 48 or 72 hours after the end of treatments.

Our data on alpha-cypermethrin residues were far below the maximum residue limits for foodstuffs of animal origin (0.2 mg/kg).

The low levels of alpha-cypermethrin residues in the lever and their absence in breast and leg muscles did not support the results of Hutson and Stoyadin (13), reporting higher alpha-cypermethrin residues in avian liver (0.97mg/g.). In our opinion, the lower concentrations of residues observed

throughout the present experiment were related to the duration of treatment. The continuous (chronic) treatment of birds with alpha-cypermethrin probably results from the mobilization of systemic mechanisms of defence against alpha-cypermethrin, thus leading to its fast elimination. The fact that synthetic pyrethroids to which alpha-cypermethrin belongs are not accumulated and not retained in the organism for a long time, i.e. they do not have a cumulative effect, also contributes to this phenomenon.

According to Hutson & Stoydin (7), Sogeval (15) the birds have a very efficient mechanisms for metabolization of alpha-cypermethrin, that is confirmed by our data too.

Therefore, even after the intake of forages treated with alpha-cypermethrin, its residues in muscles and liver of fowl remain at lower concentrations than the maximum allowed residue limits.

CONCLUSIONS

1. The determined residues of alpha-cypermethrin in birds, chronically exposed to alpha-cypermethrin, were lower than the maximum allowed residue limits in foodstuffs of animal origin.

2. After chronic treatment of fowl with alpha-cypermethrin, no residues were present in meat (white and red).

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